Integrated CNS Network for the Airport Surface

Rafael Apaza, FAA

David Matolak, Ohio University

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Surface ICNS Network

Problem Statement:

Current surface systems:

- use VHF communications for voice only (no data) that are limited in their capabilities to enable future system automation and decision support systems;
- use an aging obsolete physical communications infrastructure that is vulnerable to outages and costly to maintain and upgrade.

Objective:

Develop and demonstrate a wireless or a combination of wireless and wired surface integrated CNS network prototype that enables:

- transfer of mission critical airport voice/data among users and service providers;
- transfer of non-critical information among aircraft, tower, airport and airline operators;
- interoperability with existing and future systems and uses open systems and commercial standards;
- required redundancy and reliability;
- scalability, flexibility and upgrades
- Seamless integration with terminal communications.

Product Description:

Prototype surface integrated CNS network

- Optimum system-level architecture for surface integrated CNS network;
- Research and development of wireless transmission and data network technologies;
- Prototype surface ICNS network demonstration in an operational airport environment involving all stakeholders in which system performance, EMI resistance and environmental compatibility is demonstrated



Users

- Government
 - Federal: FAA, DHS, Customs, others
 - Local: County, City, State
 - Military Reserves
- Industry
 - Airlines
 - Cargo
 - Catering
 - Fueling
 - FBO
- General Aviation



Airport Media Used Today

Wireless

- VHF/UHF
- Trunk Radio
- Microwave
- WLAN

Wired

- Fiber Optics
- Privately Owned Copper Wire
- Leased Telco



Wireless Considerations

- For 5 GHz ARN band: ample BW, challenging channel conditions
 - Severe multipath propagation
 - Large path loss
- (For any band) Mitigate channel degradations through
 - Good channel characterization & waveform, PHY design
 - Diversity and adaptive MA design
- Security
 - WLANs are INsecure!
 - Spread spectrum + redundancy required
- Focused adaptation of commercial technologies
 - Standardization & re-use



A.1 MLS Channel Characterization A.1.1 Channel Sounding and interference characterization A.2 Surface ICNS Architecture Definition A.2.1 Surface Requirements Gathering A.2.2 Basic Concept Definition												
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A.2.2 Basic Concept Definition	_	+	•									
A.2.3 Network Architecture Definition	•											
A.2.4 Wireless System Definition	•											
A.2.5 SWIM Interface Definition	—											
A.2.6 Hybrid Architecture Analysis				•								
A.2.7 Transition Analysis			•									
A.2.8 Concept of Use Development		1										
A.3 Surface ICNS Concept Validation	•											
A.3.1 Laboratory and Ground Validation Plan	•		•									
A.3.2 Hardware Requirements Definition		•		•								
A.3.3 Laboratory Development			•									
A.3.4 Software and Interfaces Development			•									
A.3.5 Test Hardware Development												
A.3.5.1 Transmitter/Amplifier Development												
A.3.5.2 Antenna Development												
A.3.5.3 Receiver Development												
A.3.5.4 Interface Equipment Design												
A.3.6 Integrate and Test												
A.3.7 Laboratory Validation					-							
A.3.8 Outdoor System Validation												
A.4 Prototype Surface ICNS Network Demonstration	•											
A.4.1 Cost/Benefit Analysis	—											
A.4.2 Demonstration Concept Definition												
A.4.3 Software and Interfaces Development								-				
A.4.4 Prototype Hardware Development								·				
A.4.4.1 Transmitter/Amplifier Development												
A.4.4.2 Antenna Development												
A.4.4.3 Receiver Development												
A.4.4.4 Interface Equipment Design												
A.4.5 Integrate and Test										>		
A.4.6 Secure Systems Design and Validation	-											
A.4.7 Certification	—										•	
A.4.8 External Organization Interfaces												
A.4.9 Demonstration	1											=
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FY-05

Q3

Q4

Q1

Q2

Q1

FY-06

Q3

Q4

Q1

Q2

FY-07

Q3

Q4

Q1

Q2

FY-08 Q2 Q3

Q4



Milestones/Tasks

SURFACE ICNS NETWORK

Presentations

- Full Global CNS & Cat IIIc Landing Robert Crow, AirNav, Inc.
- Potentials of 2G-3G technologies for Surface Communications – Mohammed Shama, Analex Corporation
- Surface CNS Performance Analysis Using ACES Uncertainty Modeling – George Couluris, Seagull Technology, Inc.



Questions

- What Communication services are candidates for transport on a surface ICNS Network?
 - Critical, non-critical, voice, data, video...
- What wireless communications technologies should be considered?
 - 802.11(?), 3G, 4G...
- How could a wireless airport surface ICNS network be implemented to meet all airport communication requirements – who owns, manages and operates?

